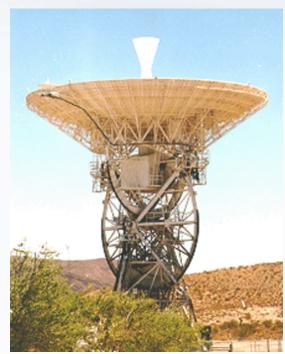
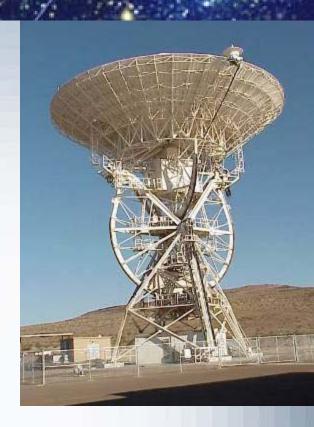
space network

Impact to GSFC Missions if DSN 26 Meter Subnet is Decommissioned

Presented to GSFC March 17, 2005







Prepared By: G. Burke A. Andujo







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California Institute of Technology

Purpose

- Determine the impact to users of the DSN assuming the DSN 26 Meter Subnet will be decommissioned on September 30, 2008
- Analyze loading on the 34 Meter Beam Wave Guide 1 (34BWG1) subnet with mission requirements formerly assigned to the 26 Meter subnet (26M) for the period of October 1, 2008 – December 31, 2012
 - Can the 34BWG1 subnet accommodate the additional loading from the Ongoing and Advanced Planning Mission sets?
 - Can we forecast that DSN will achieve at least 85% supportability?







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DSN Resource Assumptions

- 26Meter Subnet will be retired September 30, 2008
- A new 12 Meter Near-Earth Ka-Band antenna array will be implemented at Goldstone primarily to support LRO, but will require support from DSS-34 and DSS-54 by September 30, 2008





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Mission Set Assumptions

- Current approved Ongoing and Advanced missions from the February 2005 RARB
- Modified Ongoing mission set SSMO missions were modified as suggested by Goddard to predict probable support scenarios for current missions
- Future mission set is not considered in this study as the requirements available are not expected to impact the assets under study
- Future Lunar missions may be supported by 12
 Meter antenna arrays. If these 12 Meter antennas
 are not implemented then this study should be
 redone to include the future Lunar support
 requirements.



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Modifications Made to Current Ongoing Mission Set

 All requirements remain unchanged, only extended as shown except for SOHO where requirements after 2008 were decreased to two 2 hour passes per day and a maneuver every 90 Days consisting of three 8 hour passes.

Modified Current Flight Missions							
Project	Current EOM	Study EOM					
ACE	9/30/2010	12/31/2012					
Cluster	12/31/2009	12/31/2009					
IMAGE	9/30/2010	9/30/2010					
INTEGRAL	12/31/2008	9/30/2009					
SOHO	12/31/2008	12/31/2012					
WMAP	9/30/2008	9/30/2009					
Wind	9/30/2006	12/31/2012					

Requirements											
2008	2009	2009 2010 2011 20									

Current Requirements Used Modified or additional Requirements





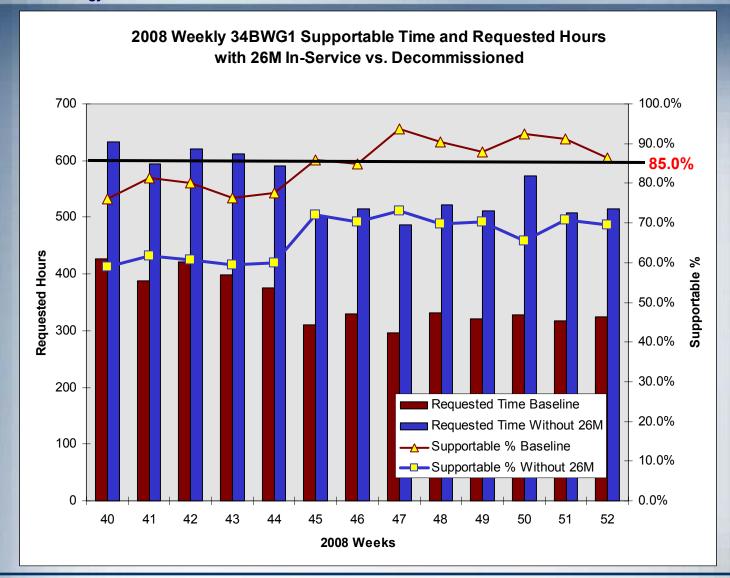


- Analysis indicates that the off-loading of the 26 Meter subnet support to the 34 Meter BWG1 subnet will:
 - In 2008 severely decreased supportability is caused by the 26 Meter Decommissioning forecasted during the period of October 1, – December 31, 2008. Weekly supportability Percentage losses range from 14.5% - 26.9%.
 - In 2009 there is very little impact from the 26 Meter decommissioning.
 Monthly supportability Percentage losses range from 0.8% 7.9%.
 - In 2010 there is very little impact from the 26 Meter decommissioning.
 Monthly supportability Percentage losses range from -0.3% 5.3%.
 Heavy loading throughout most of the year is causing severe contention.
 - In 2011 there is very little impact from the 26 Meter decommissioning.
 Monthly supportability Percentage losses range from 1.4% 4.2%.
 Heavy loading early in the year is causing moderate contention.
 - In 2012 there is very little impact from the 26 Meter decommissioning.
 Monthly supportability Percentage losses range from 0.5% 3.4%. At this time loading levels overall are workable in 2012.





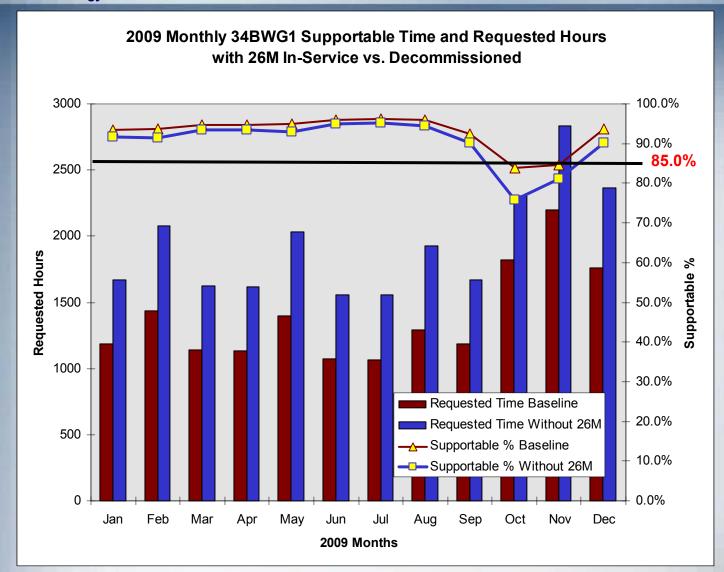








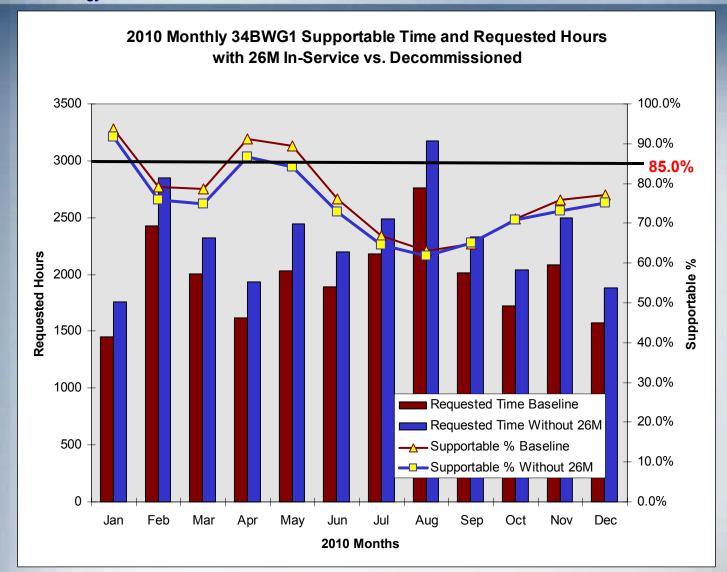








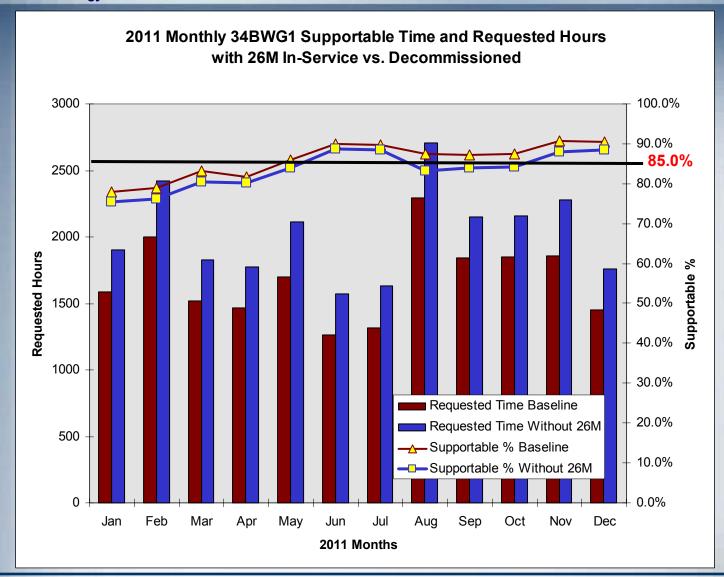








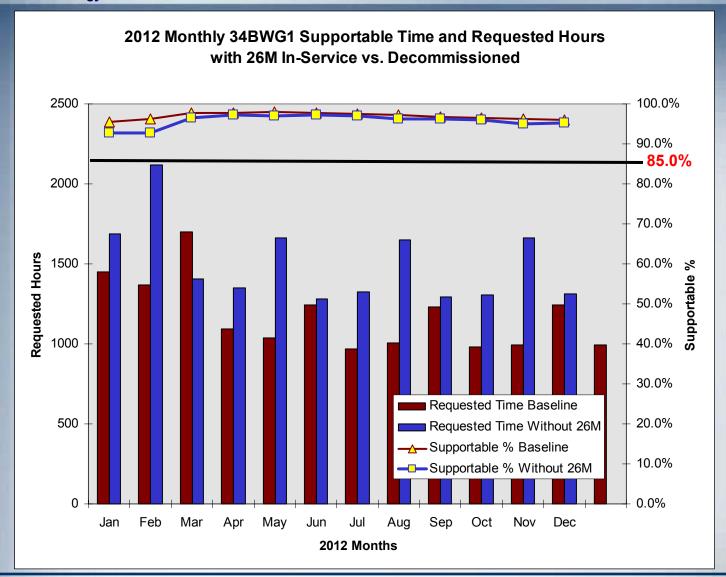


















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Conclusions

- Heavy impact in the October December time frame of 2008 when it is predicted that more missions will require 26 Meter support.
- Overall the usage after 2008 of the 26 Meter subnet is minimal therefore causing very little impact to the 34 BWG1 subnet.
- In many months between 2009 2012 the 34 BWG1 subnet is already oversubscribed, the 26 Meter loading is of little or no impact to the 34 BWG1 subnet.







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Recommendations

 It is recommended that the 26 Meter subnet not be decommissioned until January of 2009

The results of this study are subject to change, in that network loading changes, as requirements for planned missions are input and updated and periods of antenna downtime are identified.



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SSMO Consolidated ULP 2008 – 2012

With the 26 Meter Subnet in Service

SSMO Missions With 26 Meter in Service

VP		Durati		Calibrat		Jar	nuary		Fek	oruary			irch		Ар	oril		M	lay		Ju	ine		Ji	uly		Aug	ust	Se	ptemb	er	_ •	ctobe	•	No	vemb	er	De	cemb	er
Object User	Resource	Ave	Min P	re P	Post	1 2	3 4	5	6 7	8	9 1) 11	12	13 1	15	16 1	7 18	19 2	20 21	22 2	23 24	25 2	26 27	28 2	9 30	31 3	2 33	34 35	36 3	37 38	39 4	0 41	42	43 44	45 4	6 47	48 4	19 50	51 5	52 53
2008																																								
SUN ACE.	DSS-16,66					7 7		·	7 7	·																										7 7	7	7 7	7	7
SUN ACE.	DSS-46		1.0 0												3 3										3 3		3 3	3 3	3	3 3	3	3 3		3 3		3 3		3 3	3	3
CLUC CLU2 1/2/3/4 SSO CLUC CLU2 1/2/3/4 SSO	S-16/27/24/15/14 DSS-46/34/45/43		2.0 0			2 2																					2 2	2 2	2 2	2 2	2	2 2		2 2		2 2		2 2	2	2
CLUC CLU2 1/2/3/4 SSO	DSS-16/27/24/15		2.0 0							·			.					<u>=</u>		-		.		-			2		·				<u>=</u>		····				-	
CLUC CLU4 1/2/3/4 MSO	DSS-16/27/24/15		1.0 0			1			1			1			1		1			1			1		1			1		1				1		1			1	
CLUC CLU4 1/2/3/4 MSO NONE IMAG.	DSS-46/34/45/43 34B1		1.0 0				10.40			1			1			1			1		1			1			1		1			1			1			1		1
NONE MAG SCILcad	3481 3481		1.5 1			13 13 1 1																													13 1					
NONE INTG	DSS-16		5.0 0			7 7	7 7		7 7	7 7		7 7			7 7										7 7							7 7	7	7 7		7 7	7		7	7
SUN SOHO	34B1		4.0 0				- 2	2		2																										2				
SUN SOHO HSO SUN SOHO TSO	DSS-27 DSS-27,46,66		6.0 0 4.0 0				15	<u>, </u>					15						8			,		15	7 7	7	7 7	7 7	7	7 7	7	7 7	15		1	5				
SUN SOHO ISO	DSS-27,46,66		4.0 0			7 7			7 7	,°_	7	7 7	15	7	7 7		7 7	7		7	7	7	7 7	15									15	7 7			7	7	7	7
SUN SOHO	26M		4.0 0					•		*			2			2			2		2	1		2									2			1		2		
SUN SOHO	26M					14 14	14 4	14	14 14	1 4	14 1	4 14	4	14 1	4 14	4 1	4 14	14	4 14	14	14 4	14 ′	14 14										4	14 14	14	4 14	14	14 4	14 1	14
SUN SOHO HSO SUN SOHO TSO	26M 26M		4.0 0 4.0 0					۳		7						7			7		7	·		1	14 14	14 1	4 14	14 14	14 1	4 14	14 1	4 14				٠		15		
SUN WIND	20W 34B1		2.5 1			7 7	7 7	7 7	7 7	7 7	7	7 7	7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7		7 7
SUN WIND TCM	DSS-24	3.0	2.0 1	1.00 0	0.25	1									1								1									1								
ASUN VMAP.	DSS-14,43		0.6 1			4 7	7 7	7	7 7	7	7	7 7	7	7	7 7	7	4 7	7	7 7		7 7	7	7 7	7	7 7	7	7 4	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	4 7	7	7
ASUN VMAP. Mnvr. ASUN VMAP. Mnvr.	DSS-14,43 DSS-14,43		4.0 1 3.0 1			2											2										2											2		
2009																																								
SUN ACE.	DSS-16,66	3.5	3.5 0	0.70 (0.20	7 7	7 7	7 7	7 7	7 7	7	7 7	7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7
SUN ACE.	DSS-46		1.0 0			3 3																														3 3		3 3	3	3
CLUC CLU2 1/2/3/4 SSO	S-16/27/24/15/14		2.0 0			2 2																																		
CLUC CLU2 1/2/3/4 SSO CLUC CLU4 1/2/3/4 MSO	DSS-46/34/45/43 DSS-16/27/24/15		2.0 0			2 2		. 2	1			1			1		1		4 4	1	2 2		1		1		2 2	1		1		2 2		1		1		2 2	1	
CLUC CLU4 1/2/3/4 MSO	DSS-46/34/45/43	1.5	1.0 0	0.50	0.25		1	<u> </u>		1			1			1			1		1			1			1		1			1			1			1		1
NONE IMAG.	34B1					13 13																																		
NONE IMAG. SCI Load NONE INTG	34B1 DSS-16		1.5 1 5.0 0			7 7						1 1 7 7			7 7		7 7				7 7				7 7		7 7	7 7		1 1 7 7		1 1 7 7		7 7	7	1 1	1 7	7 7		7 7
SUN SOHO	26M		1.0 0			2 2																										2 2	2	2 2	2	2 2	2	2 2	2	2 2
SUN SOHO TCM	26M		4.0 0							3									3									3								3				
SUN WIND TOM	34B1 DSS-24		2.5 1			7 7	. 7 . 7		77	7	7	77	7		77	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7		7 7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7
ASUN WMAP.	DSS-14,43		0.6 1			4 7	7 7	7 7	7 7	7 7	7	7 7	7	7	7 7	7	4 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 4	7 7	7	7 7	7	3								
ASUN VMAP. Mnvr.	DSS-14,43		4.0 1			1											1										1													
ASUN VMAP, Movr.	DSS-14,43	3.0	3.0 1	.25 (0.25	2											2										2													
2010																																								
SUN ACE.	DSS-16,66 DSS-46		3.5 0 1.0 0			7 7	7 7	7	7 7	7	7	7 7	7	7	7 7	7									7 7													7 7	7	7
NONE IMAG.	34B1					13 13																											<u>.</u>			. <u>.</u>			<u>v</u>	
NONE IMAG. SCI Load	34B1					1 1																																		
SUN SOHO SUN SOHO TOM	26M 26M		1.0 0 4.0 0			2 2	2 2	2	2 2	2 2	2	2 2	2	2	2 2	2	2 2	2	2 2		2 2	2	2 2	2	2 2	2	2 2	2 2	2	2 2	2	2 2	2	2 2	2	2 2	2	2 2	2	2
SUN WIND	26M 34B1		2.5 1			7 7	7 7	7 7	7 7		7	7 7	7	7	7 7	7	7 7	7	7 7		7 7	7	7 7	7	7 7	7	7 7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7
SUN WIND TCM	DSS-24		2.0 1			1									1								1									1								
2011																																								
SUN ACE.	DSS-16,66					7 7																														7 7	7	7 7	7	7
SUN ACE. SUN SOHO	DSS-46 26M		1.0 0			3 3																													3 2					
SUN SOHO TOM	26M		4.0 0							2 2		2			<u></u>			<u>∠</u>	2 2			2			<u> </u>		<u> </u>	3							<u></u>	2 2				
SUN WIND	34B1	2.5	2.5 1	1.00 0	0.25	7 7	7 7	7	7 7		7	7 7	7	7	7 7	7	7 7	7			7 7	7	7 7	7	7 7	7	7 7		7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7
SUN WIND TCM	DSS-24	3.0	2.0 1	.00 0	0.25	1									1								1									1								
2012																																								
SUN ACE. SUN ACE.	DSS-16,66 DSS-46					7 7																																7 7	7	7
SUN ACE.	USS-46 26M					3 3																																		
SUN SOHO TOM	26M		4.0 0							3		4							3									3		- 4						3				
SUN WIND	34B1		2.5 1			7 7	7 7	7	7 7	7	7	7 7	7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7 7	7	7
SUN WIND TCM	DSS-24	1 3.0	2.0 1	.00 (U.25	1									1								1									1								



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SSMO Consolidated ULP 2008 – 2012

Without the 26 Meter Subnet in Service

SSMO Missions Without 26 Meter in Service

VP Object User	Durations Calibration Resource Ave Min Pre Post	January February March April May June July August September October November December 1 2 3 4 5 6 7 8 9 10 11 2 14 4 16 14 4 24 44 4 24 44 4 24 44 4 24 44 4 24 44 4 24 44 4 24 44 4 24 24 44 4 24 24 44 5 5 5 3 7 38 24 4 24 24 44 5 5 5 5 3 7 38 24
	Resource Ave will Pre Post	1 2 3 4 3 0 7 0 9 10 11 12 13 14 13 10 17 10 13 20 21 22 23 24 23 20 27 22 30 31 32 33 34 33 30 37 30 38 40 41 42 43 44 43 44 40 48 30 10 22 33
2008	·····	
SUN ACE.	DSS-24,54 3.5 3.5 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN ACE. CLUC CLU2 1/2/3/4 SSO	DSS-34 1.0 1.0 0.70 0.20 DSS-24/27/15/14 2.0 2.0 0.50 0.25	$f 3 \ 3 \ 3 \ 3 \ 3 \ 3 \ 3 \ 3 \ 3 \ 3 $
CLUC CLU2 1/2/3/4 SSO	DSS-34/45/43 2.0 2.0 0.50 0.25	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
CLUC CLU2 1/2/3/4 SSO	DSS-27/24/15 2.0 2.0 0.50 0.25	2
CLUC CLU4 1/2/3/4 MSO	DSS-27/24/15 1.5 1.0 0.50 0.25	1 1 1 1 1 1 1 1 1 1
CLUC CLU4 1/2/3/4 MSO NONE IMAG.	DSS-34/45/43 1.5 1.0 0.50 0.25 34B1 0.8 0.8 1.00 0.25	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
NONE IMAG. SCI Load	34B1 1.5 1.5 1.00 0.25	18 18 18 18 18 18 18 18 18 18 18 18 18 1
NONE INTG	DSS-24 5.3 5.0 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN SOHO	34B1 8.0 4.0 0.70 0.20	2 2 2
SUN SOHO	34B1 9.6 4.0 0.70 0.20 34B1 8.0 4.0 0.70 0.20	
SUN SOHO		14 14 14 14 14 14 14 14 14 14 14 14 14 1
SUN SOHO HSO	34B1 8.0 4.0 0.70 0.20	14 14 14 14 14 14 14 14 14 14 14 14 14
SUN SOHO TSO	34B1 8.0 4.0 0.70 0.20	7 7 7 7 15
SUN SOHO HSO	DSS-27 8.0 6.0 0.40 0.20	7777777777
SUN SOHOTSO SUN WIND	DSS-27,34,54 8.0 4.0 0.70 0.20 34B1 2.5 2.5 1.00 0.25	
SUN WIND TOM	DSS-24 3.0 2.0 1.00 0.25	1 1 1
ASUN WMAP.	DSS-14,43 0.7 0.6 1.25 0.25	4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 4 7
ASUN VVMAP Mnvr.	DSS-14,43 5.0 4.0 1.25 0.25	1 1 1
ASUN VVMAP, Mnvr.	DSS-14,43 3.0 3.0 1.25 0.25	2 2 2
2009		
SUN ACE.	DSS-24,54 3.5 3.5 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN ACE.	DSS-34 1.0 1.0 0.70 0.20	
CLUC CLU2 1/2/3/4 SSO CLUC CLU2 1/2/3/4 SSO	DSS-34/45/43 2.0 2.0 0.50 0.25 DSS-27/24/15/14 2.0 2.0 0.50 0.25	
CLUC CLU4 1/2/3/4 MSO	DSS-27/24/15 1.5 1.0 0.50 0.25	
CLUC CLU4 1/2/3/4 MSO	DSS-34/45/43 1.5 1.0 0.50 0.25	1 1 1 1 1 1 1 1 1 1 1
NONE IMAG.		13 13 13 13 13 13 13 13 13 13 13 13 13 1
NONE IMAG. SCI Load NONE INTG	34B1 1.5 1.5 1.00 0.25 DSS-24 5.3 5.0 0.70 0.20	<u> </u>
SUN SOHO		$\begin{smallmatrix} 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 $
SUN SOHO TCM	34B1 8.0 4.0 0.70 0.20	3 3 3
SUN WIND	34B1 2.5 2.5 1.00 0.25	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN WIND TCM ASUN WIMAP.	DSS-24 3.0 2.0 1.00 0.25 DSS-14.43 0.7 0.6 1.25 0.25	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
ASUN VMAP. Mnvr.	DSS-14,43 5.0 4.0 1.25 0.25	1 1
ASUN VVMAP. Mnvr.	DSS-14,43 3.0 3.0 1.25 0.25	2 2
2010		
SUN ACE.	DSS-24,54 3.5 3.5 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN ACE.	DSS-34 1.0 1.0 0.70 0.20	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
NONE IMAG.		13 13 13 13 13 13 13 13 13 13 13 13 13 1
NONE IMAG. SCI Load SUN SOHO	34B1 1.5 1.5 1.00 0.25 34B1 2.0 1.0 0.70 0.20	$\begin{smallmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 $
SUN SOHO TOM	34B1 8.0 4.0 0.70 0.20	3 3 3 3 3
SUN WIND	34B1 2.5 2.5 1.00 0.25	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN WIND TOM	DSS-24 3.0 2.0 1.00 0.25	1 1 1
2011		
SUN ACE.	DSS-24,54 3.5 3.5 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN ACE.	DSS-34 1.0 1.0 0.70 0.20	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
SUN SOHO	34B1 2.0 1.0 0.70 0.20	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
SUN SOHO TCM SUN WIND	34B1 8.0 4.0 0.70 0.20 34B1 2.5 2.5 1.00 0.25	3 3 3 3 3 3 3 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN WIND TOM	DSS-24 3.0 2.0 1.00 0.25	1 1 1
2012	<u> </u>	
SUN ACE.	DSS-24.54 3.5 3.5 0.70 0.20	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SUN ACE.	DSS-24,54 3.5 3.5 0.70 0.20 DSS-34 1.0 1.0 0.70 0.20	
SUN SOHO	34B1 2.0 1.0 0.70 0.20	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
SUN SOHO TCM	34B1 8.0 4.0 0.70 0.20	3 3 3
SUN WIND TCM	34B1 2.5 2.5 1.00 0.25 DSS-24 3.0 2.0 1.00 0.25	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
SOM WIND ICM	DOS-24 3.0 2.0 1.00 0.25	1 1 1